Trend Study 16C-15-04

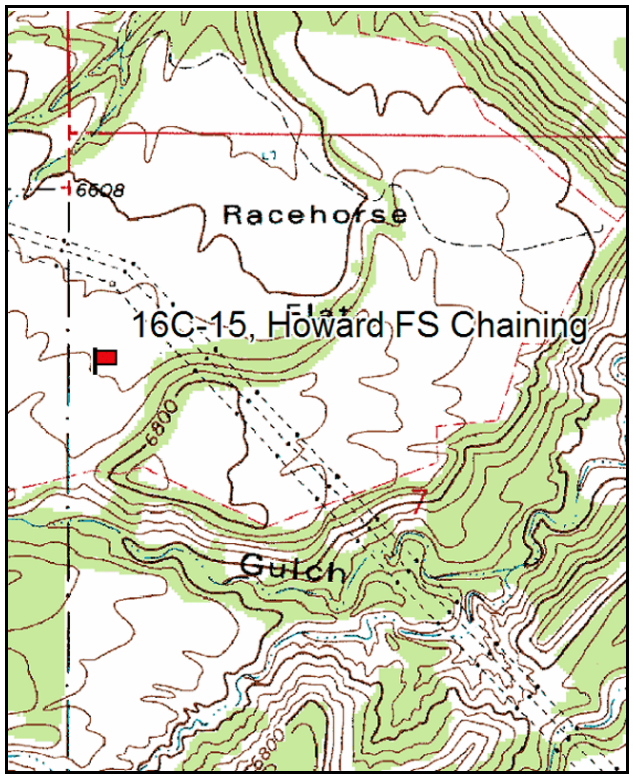
Study site name: Howard FS Chaining . Vegetation type: Chained, Seeded P-J .

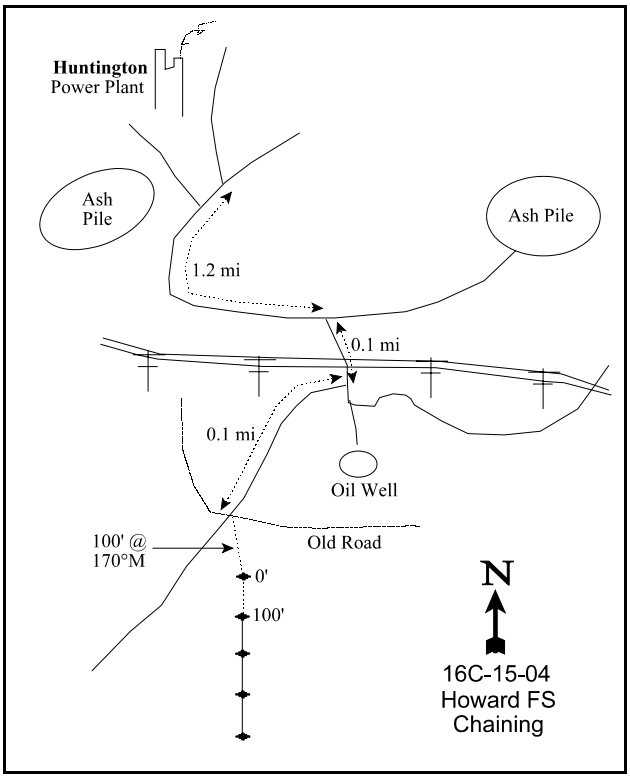
Compass bearing: frequency baseline 165 degrees magnetic.

Frequency belt placement: line 1 (11 & 95ft), line 2 (34ft), line 3 (59ft), line 4 (71ft).

LOCATION DESCRIPTION

The shortest route to reach this study area is through the Huntington Power Plant. From the main building, go through the plant to the SE gate. Continue on the paved road 0.85 miles to a fork. The plant's ash pile is on the right. Bear left to a bridge or continue around the head of a small draw, following the road southeast towards the powerline. About 0.15 miles from the bridge there is an old fence. Go 0.1 miles to another fence. Continue up through the chaining, past the powerlines, for 0.25 miles to a large white rock with a red-painted spot, on the right side of the road. From the rock, walk 60 feet west to the first baseline stake. The fencepost is marked with browse tag #7881. The other study stakes run south at 100 foot intervals.





Map Name: Red Point

Diagrammatic Sketch

Township 17S , Range 8E , Section 7

GPS: NAD 27, UTM 12S 4356668 N, 493454 E

DISCUSSION

Howard FS Chaining - Trend Study No. 16C-15

Located on the BLM side of the fence on Racehorse Flat, by an area known as the Howard-Forest Service Chaining, this study site samples a pinyon-juniper/black sagebrush range site that was chained and seeded in the early 1970's. A variety of browse were seeded, including a palatable ecotype of basin big sagebrush. Like the previous study, it is in the West Huntington Cattle Allotment where reductions have been made in spring cattle grazing. This chaining appears to receive light use by cattle with abundant sign of deer winter use. Pellet group data from 1999 estimated 42 deer, 1 elk and 15 cow days use/acre (104 ddu/ha, 3 edu/ha, 37 cdu/ha). There was also some old sheep sign. A small percentage of the cow pats were fresh but most appeared to be from the previous grazing season. Deer use was estimated at 98 days use/acre (243 ddu/ha) in 2004. Elk use was estimated at 12 days use/acre (30 edu/ha) while cattle use was estimated at 16 days use/acre (39 cdu/ha). Most of the deer and elk pellet groups appeared to be from winter use while about 1/3 are from spring use. Cattle pats appeared to be from the previous grazing season.

The study site has a northwest aspect with a 3-5% slope and an elevation of 6,650 feet. The soil is relatively shallow and very rocky with a high percentage of boulders on the surface and below. Effective rooting depth is estimated at 13 inches. Soil texture is a sandy clay loam with a slightly alkaline pH (7.6). Phosphorus levels are marginal at 6.3 ppm. Values less than 10 ppm can limit normal plant growth and development. There are signs of localized erosion in the form of surface litter movement, soil pedestalling, rills, and gullies on the site. Herbaceous cover is very low and only the residual chaining litter prevents more serious soil movement. A soil erosion condition assessment classified erosion as moderate in 2004.

Pinyon and juniper trees dominate the site by providing 74% of the total shrub cover in 2004 with a canopy cover value of 20%. Thinning the pinyon-juniper trees should be a high priority for this site because when canopy cover approaches and exceeds 20%, the understory becomes severely reduced on average to only about 5% understory cover (Tausch 1994). Point-center quarter data from 1999 estimated 321 juniper and 90 pinyon trees/acre. In 2004 this increased to 381 juniper and 144 pinyon trees/acre. Average diameter was 2.1 inches for juniper and 5.0 for pinyon in 1999. This decreased in 2004 to 1.9 inches for juniper and 3.7 inches for pinyon, which indicates an increase in young trees. Approximately 55% of the juniper trees sampled were in the 1 to 4 foot height range, while an additional 45% were 4 to 8 feet tall. More than half of the pinyon trees sampled were large trees 8 to 12 feet tall.

The key browse species on the flat consist of a mixture of basin big sagebrush, black sagebrush, and Wyoming big sagebrush. There is apparently some hybridizing occurring between the Wyoming big sagebrush and the lower growing black sagebrush. All sagebrush species individually show evidence of moderate and some heavy use. The mature basin big sagebrush were tall, with good vigor, although there were few young or seedlings. Black sagebrush population also contains few seedling or young plants. Wyoming big sagebrush is the most common shrub on the site. It was identified as basin big sagebrush in 1988. Overall sagebrush density has decreased since 1988 due to a major decline in the number of young plants. Drought conditions combined with increasing competition with pinyon and juniper trees probably caused the majority of the mortality.

Other, less abundant preferred browse found on the site include, white rubber rabbitbrush, four-wing saltbush, and true mountain mahogany. True mountain mahogany is mostly unavailable, moderately to heavily used, and decadent. Although, this condition would be expected when the population is only 20 plants/acre and one of the most preferred browse species for deer. White rubber rabbitbrush is fairly abundant but appears to be declining. It displays moderate to heavy use, declining young recruitment, poor vigor, and increasing decadency.

The herbaceous understory is poor and produced less than 6% cover in 1999 and less than 3% in 2004. The seeded crested wheatgrass is the only abundant herbaceous species on the site. It provided 96% of the grass cover and 82% of the herbaceous cover in 1994. Intermediate wheatgrass, smooth brome, Indian ricegrass, bottlebrush squirreltail, and Russian wildrye were all encountered in 1988, however only Russian wildrye and a few Indian ricegrass plants were found in 1999. Native forbs are rare, except for a *Cryptantha* spp. and a few annual mustards.

1994 TREND ASSESSMENT

Ground cover characteristics are similar to those of 1988, with the exception of litter cover which has declined. This is primarily the result of diminishing chaining debris. Percent bare ground has remained fairly stable, although increasing slightly. Soil trend is still considered stable. The browse trend is down slightly due to the lack of seedlings and the large decline in young plants. This trend will most likely be reversed when normal precipitation patterns return. Trend for herbaceous plants is slightly down due to a decline in the sum of nested frequencies for grasses and forbs. The Desirable Components Index (see methods) rated this site as fair with a score of 35 due to high decadence and low perennial forb and grass cover.

TREND ASSESSMENT
soil - stable (3)
browse - down slightly (2)
herbaceous understory - down slightly (2)
winter range condition (DC Index) - 35 (fair) Wyoming/Basin big sagebrush type

1999 TREND ASSESSMENT

Trend for soil is stable due to similar ground cover characteristics compared to those of 1994. Trend for browse is stable with respect to sagebrush. Density of all sagebrush species combined has remained similar to 1994 estimates. Seedlings and young plants are still limited, but at slightly higher levels compared to 1994. It appears that the basin big sagebrush are not doing as well as the black and Wyoming big sagebrush. Nearly one-third of the basin big sagebrush sampled display poor vigor and percent decadence has increased from 10% in 1994 to 32% currently. Rubber rabbitbrush is also showing signs of decline. It's population density has declined 36%, with 34% of the population displaying poor vigor, and percent decadence increase from 11% to 54%. No seedlings have been found on the site since 1988 and the proportion of young plants has steadily declined from 90% in 1988, to 22% in 1994, and only 9% by 1999. Released pinyon and juniper trees appear to be increasing in size. They provided 52% of the browse cover in 1994 and 61% in 1999. Taking all of these factors into consideration, trend for browse is considered stable since the key species, Wyoming big sagebrush, appears to have a stable population. Use is heavier than in 1994, but vigor has improved slightly, young recruitment has improved, and percent decadence has remained similar (23% vs 21%). This trend will change for the worse as the pinyon and juniper trees increase in size and density. Trend for the herbaceous understory is up slightly for perennial grasses but down for forbs. Overall the herbaceous understory is poor with grasses and forbs producing only about 6% cover in 1994 and 1999. Crested wheatgrass is the dominant species. It currently provides 92% of the grass cover and 84% of the herbaceous cover. It declined significantly in nested frequency between 1988 and 1994, but it has increased significantly since 1994. Forbs are rare and provide less than 1% cover. Trend is considered up slightly. The Desirable Components Index rated this site as fair with a score of 30 due to increasing high decadence and low perennial forb and grass cover.

TREND ASSESSMENT
soil - stable (3)
browse - stable (3)
herbaceous understory - up slightly (4)
winter range condition (DC Index) - 30 (fair) Wyoming/Basin big sagebrush type

2004 TREND ASSESSMENT

Trend for soil is down slightly. Cover of bare ground has increased and the ratio of protective ground cover (vegetation, litter, and cryptogams) to bare ground has declined since 1999. There is evidence of soil erosion in the form of soil pedestalling, rills, gullies, and soil movement. The erosion condition class determined soil erosion as moderate in 2004. Trend for the key browse species, black sagebrush, basin big sagebrush, and Wyoming big sagebrush combined is considered slightly down. Black sagebrush has increased slightly in density since 1999. It shows mostly light use, good vigor, and low decadence. Basin big sagebrush shows moderate to heavy use, poor reproduction, and increasing decadence. Wyoming big sagebrush is the most palatable sagebrush species on the site. Density has declined by 60% since 1999. Utilization remains moderate to heavy. Average vigor is poor on one-half of the plants sampled and 60% of the population was classified as decadent. Rubber rabbitbrush is another preferred browse species. It has declined in density 31% since 1999. Average vigor remained poor on about one-third of the population and percent decadence has remained high at 58%. Another negative factor is the increase in canopy cover for pinyon and juniper trees. Average cover has increased form 7% (1999) to 20% (2004), it has increased by 186%. Trend for the herbaceous understory is down. Crested wheatgrass is the only abundant perennial species on the site. It has declined significantly in nested frequency since 1999 and average cover has dropped 49% from a cover value of 5% to 2.5%. All perennial grasses were found growing within the protection of chaining litter or tree and shrub canopies. The forb component is diverse but all species are rare in their occurrence. The Desirable Components Index rated this site as poor with a score of 14 due to increasing high decadence, decreasing shrub cover, and decreasing perennial grass cover.

TREND ASSESSMENT
soil - down slightly (2)
browse - down slightly (2)
herbaceous understory - down (1)
winter range condition (DC Index) - 14 (poor) Wyoming/Basin big sagebrush type

HERBACEOUS TRENDS --
Management unit 16C, Study no: 15

Type	Species	Nested Frequency				Average Cover %		
		'88	'94	'99	'04	'94	'99	'04
G	Agropyron cristatum	$_{c}$246	$_{b}$186	$_{c}$233	$_{a}$99	5.15	4.95	2.51
G	Agropyron intermedium	6	2	-	-	.00	-	-
G	Bromus inermis	4	-	-	-	-	-	-
G	Elymus junceus	$_{b}$35	$_{a}$9	$_{a}$11	$_{a}$14	.18	.42	.41
G	Oryzopsis hymenoides	7	5	3	-	.04	.01	.00
G	Poa fendleriana	-	1	-	-	.00	-	-
G	Sitanion hystrix	$_{b}$28	$_{a}$-	$_{a}$-	$_{a}$2	-	-	.00
Total for Annual Grasses		0	0	0	0	0	0	0

Type	Species	Nested Frequency				Average Cover %		
		'88	'94	'99	'04	'94	'99	'04
Total for Perennial Grasses		326	203	247	115	5.39	5.39	2.93
Total for Grasses		326	203	247	115	5.39	5.39	2.93
F	Arabis spp.	15	4	1	-	.01	.00	-
F	Chenopodium fremontii (a)	-	7	-	2	.01	-	.01
F	Chenopodium leptophyllum(a)	-	-	-	4	-	-	.01
F	Cirsium spp.	1	-	-	-	-	-	-
F	Cryptantha spp.	$_{c}$100	$_{bc}$67	$_{ab}$36	$_{a}$11	.58	.32	.20
F	Descurainia pinnata (a)	-	$_{b}$21	$_{a}$-	$_{b}$27	.05	-	.11
F	Draba spp. (a)	-	1	-	-	.00	-	-
F	Eriogonum umbellatum	16	18	8	8	.04	.04	.22
F	Gilia spp. (a)	-	-	-	11	-	-	.02
F	Ipomopsis aggregata	-	-	-	3	-	-	.00
F	Lappula occidentalis (a)	-	-	-	3	-	-	.01
F	Lactuca serriola	-	-	-	3	-	-	.00
F	Lepidium densiflorum (a)	-	-	-	1	-	-	.00
F	Medicago sativa	3	-	-	-	-	-	-
F	Penstemon carnosus	18	9	12	11	.03	.05	.07
F	Pedicularis centranthera	-	-	-	1	-	-	.03
F	Ranunculus testiculatus (a)	-	-	1	-	-	.00	-
F	Salsola iberica (a)	-	$_{b}$23	$_{a}$-	$_{a}$-	.09	-	-
F	Schoencrambe linifolia	$_{b}$16	$_{ab}$13	$_{a}$5	$_{a}$-	.05	.01	.00
F	Streptanthus cordatus	-	-	2	-	-	.00	-
F	Taraxacum officinale	2	-	-	-	-	-	-
F	Townsendia incana	2	-	-	-	-	-	-
F	Unknown forb-perennial	4	-	-	-	-	-	-
Total for Annual Forbs		0	52	1	48	0.16	0.00	0.16
Total for Perennial Forbs		177	111	64	37	0.72	0.44	0.53
Total for Forbs		177	163	65	85	0.89	0.44	0.70

Values with different subscript letters are significantly different at alpha = 0.10

BROWSE TRENDS --
Management unit 16C, Study no: 15

Type	Species	Strip Frequency			Average Cover %		
		'94	'99	'04	'94	'99	'04
B	Artemisia nova	16	10	13	.45	.18	.48
B	Artemisia tridentata tridentata	10	16	17	.85	.75	2.67
B	Artemisia tridentata wyomingensis	39	34	16	2.58	2.59	.78
B	Atriplex canescens	1	0	1	-	-	-
B	Cercocarpus montanus	2	2	1	-	-	.00
B	Chrysothamnus nauseosus hololeucus	37	28	18	1.36	1.86	.81
B	Juniperus osteosperma	0	24	26	2.03	3.29	4.39
B	Opuntia spp.	2	0	0	-	-	-
B	Pinus edulis	0	8	10	3.84	5.18	9.03
Total for Browse		107	122	102	11.14	13.88	18.18

CANOPY COVER, LINE INTERCEPT --
Management unit 16C, Study no: 15

Species	Percent Cover	
	'99	'04
Artemisia nova	-	1.60
Artemisia tridentata tridentata	-	1.48
Artemisia tridentata wyomingensis	-	1.29
Chrysothamnus nauseosus hololeucus	-	1.16
Juniperus osteosperma	2.40	8.28
Pinus edulis	4.59	11.69

KEY BROWSE ANNUAL LEADER GROWTH --
Management unit 16C, Study no: 15

Species	Average leader growth (in)
	'04
Artemisia tridentata	1.6
Artemisia nova	3.6

POINT-QUARTER TREE DATA --
Management unit 16C, Study no: 15

Species	Trees per Acre		
	'94	'99	'04
Pinus edulis	-	90	144
Juniperus osteosperma	-	321	381

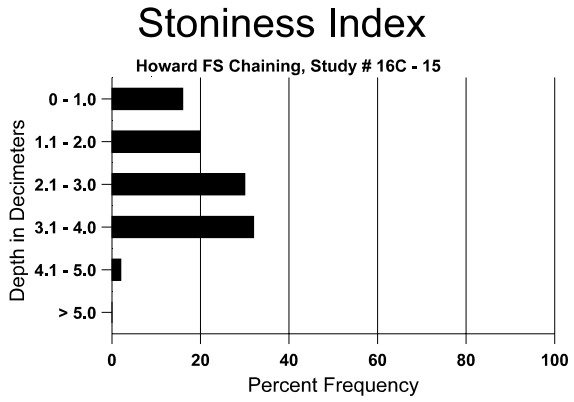
Average diameter (in)		
'94	'99	'04
-	5	3.68
-	2.1	1.91

BASIC COVER --
Management unit 16C, Study no: 15

Cover Type	Average Cover %			
	'88	'94	'99	'04
Vegetation	3.25	17.63	18.36	20.39
Rock	12.25	10.96	8.97	10.26
Pavement	4.00	2.89	7.18	8.02
Litter	52.50	29.82	36.51	37.95
Cryptogams	0	.03	.81	.69
Bare Ground	28.00	29.45	30.02	36.27

SOIL ANALYSIS DATA --
Management unit 16C, Study no: 15, Study Name: Howard FS Chaining

Effective rooting depth (in)	Temp °F (depth)	pH	%sand	%silt	%clay	%0M	PPM P	PPM K	ds/m
13.0	60.7 (13.9)	7.6	54.7	23.4	21.8	5.1	6.3	80.0	0.8



PELLET GROUP DATA --
Management unit 16C, Study no: 15

Type	Quadrat Frequency		
	'94	'99	'04
Sheep	-	3	-
Rabbit	11	53	3
Elk	4	5	-
Deer	62	51	43
Cattle	1	5	2

Days use per acre (ha)	
'99	'04
12 (30)	-
-	-
1 (2)	12 (30)
42 (104)	98 (243)
15 (37)	16 (39)

BROWSE CHARACTERISTICS --
Management unit 16C, Study no: 15

		Age class distribution (plants per acre)					Utilization					
Year	Plants per Acre (excluding seedlings)	Seedling	Young	Mature	Decadent	Dead	% moderate	% heavy	% decadent	% dying	% poor vigor	Average Height Crown (in)
Artemisia nova												
88	**66**	-	-	66	-	-	0	0	0	-	0	6/14
94	**1020**	-	-	820	200	-	47	16	20	4	4	8/20
99	**540**	-	40	420	80	40	63	26	15	-	0	6/16
04	**700**	-	-	620	80	40	11	9	11	9	9	8/18
Artemisia tridentata tridentata												
88	**5132**	1866	4466	466	200	-	19	4	4	-	5	30/28
94	**200**	-	40	140	20	-	20	0	10	-	0	41/46
99	**440**	-	100	200	140	40	27	5	32	27	27	31/34
04	**580**	-	-	240	340	80	52	34	59	17	17	33/36
Artemisia tridentata wyomingensis												
88	**0**	-	-	-	-	-	0	0	0	-	0	-/-
94	**1300**	20	20	980	300	260	25	3	23	18	22	21/25
99	**1720**	20	180	1180	360	80	44	19	21	9	10	17/24
04	**400**	-	80	80	240	240	35	20	60	50	50	21/22
Atriplex canescens												
88	**0**	-	-	-	-	-	0	0	0	-	0	-/-
94	**20**	-	-	20	-	-	0	0	0	-	0	30/29
99	**0**	-	-	-	-	-	0	0	0	-	0	25/18
04	**20**	-	-	-	20	-	0	100	100	100	100	30/22
Cercocarpus montanus												
88	**0**	-	-	-	-	-	0	0	0	-	0	-/-
94	**40**	-	-	-	40	-	50	50	100	50	50	18/19
99	**40**	-	-	-	40	-	100	0	100	100	100	-/-
04	**20**	-	-	-	20	20	0	100	100	-	0	22/21

		Age class distribution (plants per acre)					Utilization					
Year	Plants per Acre (excluding seedlings)	Seedling	Young	Mature	Decadent	Dead	% moderate	% heavy	% decadent	% dying	% poor vigor	Average Height Crown (in)
Chrysothamnus nauseosus												
88	**0**	-	-	-	-	-	0	0	-	-	0	-/-
94	**0**	-	-	-	-	-	0	0	-	-	0	-/-
99	**0**	-	-	-	-	-	0	0	-	-	0	-/-
04	**0**	-	-	-	-	-	0	0	-	-	0	13/17
Chrysothamnus nauseosus hololeucus												
88	**1999**	466	1800	66	133	-	37	7	7	-	7	29/21
94	**1100**	-	240	740	120	-	5	5	11	2	2	23/25
99	**700**	-	60	260	380	100	40	40	54	29	34	37/36
04	**480**	20	40	160	280	80	33	17	58	29	38	24/27
Gutierrezia sarothrae												
88	**0**	-	-	-	-	-	0	0	-	-	0	-/-
94	**0**	-	-	-	-	-	0	0	-	-	0	-/-
99	**0**	-	-	-	-	-	0	0	-	-	0	-/-
04	**0**	-	-	-	-	-	0	0	-	-	0	9/13
Juniperus osteosperma												
88	**933**	-	933	-	-	-	0	0	-	-	21	-/-
94	**0**	-	-	-	-	-	0	0	-	-	0	-/-
99	**540**	-	420	120	-	60	0	0	-	-	11	-/-
04	**680**	-	320	360	-	-	0	0	-	-	0	-/-
Opuntia spp.												
88	**0**	-	-	-	-	-	0	0	-	-	0	-/-
94	**80**	-	-	80	-	-	0	0	-	-	0	3/12
99	**0**	-	-	-	-	-	0	0	-	-	0	-/-
04	**0**	-	-	-	-	-	0	0	-	-	0	6/12
Pinus edulis												
88	**200**	-	200	-	-	-	0	0	-	-	0	-/-
94	**0**	-	-	-	-	-	0	0	-	-	0	-/-
99	**160**	20	20	140	-	-	0	0	-	-	0	-/-
04	**220**	-	20	200	-	-	0	0	-	-	0	-/-
Pinus edulis chained												
88	**66**	-	-	-	66	-	0	0	100	-	0	-/-
94	**0**	-	-	-	-	-	0	0	0	-	0	-/-
99	**0**	-	-	-	-	-	0	0	0	-	0	-/-
04	**0**	-	-	-	-	-	0	0	0	-	0	-/-

		Age class distribution (plants per acre)					Utilization					
Year	Plants per Acre (excluding seedlings)	Seedling	Young	Mature	Decadent	Dead	% moderate	% heavy	% decadent	% dying	% poor vigor	Average Height Crown (in)
Purshia tridentata												
88	**0**	-	-	-	-	-	0	0	-	-	0	-/-
94	**0**	-	-	-	-	-	0	0	-	-	0	16/32
99	**0**	-	-	-	-	-	0	0	-	-	0	-/-
04	**0**	-	-	-	-	-	0	0	-	-	0	9/35